REMARKS

Claims 1-14 are pending in this application. Claim 4 is canceled without prejudice or disclaimer, and claim 1 is amended herein. Upon entry of this amendment, clams 1-3 and 5-14 will be pending in this application.

No new matter is added by this amendment. Support for the amendment to claim 1 may be found in original claim 4.

Claims 1-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Skelhorn. (Office action page 2)

Reconsideration of the rejection is respectfully requested in view of the amendments to the claims. Applicant notes that claim 1 has been amended to incorporate the limitation of claim 4, which has accordingly been canceled without prejudice or disclaimer.

The present invention

The present invention is, as recited in claim 1, provides an agglomerate comprising fine primary particles of a synthesized calcium carbonate, the agglomerate satisfying the following expressions (a) to (e):

(a) $0.5 \leqq dp_{50} \leqq 20$ [μm]

(b) $0 \leqq \alpha \leqq 2.5$ [-]

(c) $30 \leqq Sw$ [m^2/g]

(d) $20 \leqq St \leqq 150$ [MPa] and

(e) $200 \leqq Sta \leqq 600$ [MPa],

wherein

dp_{50}: the average particle diameter [μm] of the agglomerate measured by Microtrac-FRA, a laser analysis type particle size distribution measurement apparatus,

α: the value calculated by dividing the difference between the particle diameter d_{90} of cumulative 90% minus sieve particles of the agglomerate and the particle diameter d_{10} of cumulative 10% minus sieve particles of the agglomerate calculated by the Microtrac-FRA, a laser analysis type particle size distribution measurement apparatus by the average particle diameter dp_{50} according to the following equation:

$\alpha = (d_{90} - d_{10})/dp_{50}$,

d_{90}: the particle diameter of cumulative 90% minus sieve particles of the agglomerate measured by the Microtrac-FRA, a.laser analysis type particle size distribution measurement apparatus,

d_{10}: the particle diameter of cumulative 10% minus sieve particles of the agglomerate measured by the Microtrac-FRA, a laser analysis type particle size distribution measurement apparatus,

Sw: the BET specific surface area of the agglomerate [m^2/g],

St: the tensile strength [MPa] required to break the agglomerate with the particle diameter 4 μm, measured by a micro compression testing machine manufactured by Shimadzu Corporation, and

Sta: the tensile strength [MPa] required to break 30% of the particle diameter of the agglomerate with the particle diameter 4 μm, measured by a micro compression testing machine manufactured by Shimadzu Corporation.

That is, the present invention provides particles providing good anti-blocking property and slipping properties while avoiding deterioration of transparency of films and sheets of resins and suppressing the haze by controlling the voids formed between the inorganic particles to be added and resins, and controlling the breakage and dispersion of the particles that are attributed to the stress caused at the time of kneading the particles with resins and drawing the resulting resins.

Such particles of the present invention require the agglomerates comprising fine primary particles of a synthesized calcium carbonate satisfying the average particle diameter dp_{50} defined by (a), the sharpness a defined by (b), the BET specific surface area Sw defined by (c), the tensile strength St required to break the agglomerate with the particle diameter 4 μm defined by (d) (hereinafter referred to "first tensile strength") and the tensile strength Sta required to break 30% of the particle diameter of the agglomerate with the particle diameter 4 μm defined by (e) (hereinafter referred to "second tensile strength").

When the particle diameter dp_{50} is less than 0.5 μm, although it depends on the set film thickness of a film and a sheet to which the agglomerate is added, it would be impossible to form

proper projections in the surface of the film or sheet and thus provide the anti-blocking property and slipping property without deteriorating the necessitated physical properties such as haze, transparency, and electrical properties. When the particle diameter dp_{50} exceeds 20 μm, although it depends of the film thickness of a film and a sheet to which the agglomerate is added, the agglomerate deteriorates the appearance of the film and the sheet and in the case where the film or the sheet is used for a base film of a magnetic recording medium or a capacitor, it is probable to cause problems such as dissociation of particles attributed to contact with a guide or electric insulation failure and to decrease the product value (see specification, page 16, line 3 from bottom, to page 17, line 12).

When α exceeds 2.5, since the agglomerate contains many unnecessary fine particles and coarse particles and when it is added to a film or sheet, it cannot provide proper roughness to the surface without deteriorating other physical properties such as the toughness, light transmission property or the like (see specification, page 17, bottom line, to page 18, line 4).

When the BET specific surface area Sw is less than 30 m^2/g, the surface energy of the particles themselves becomes small and therefore the particles are easily dispersed to make it difficult to form a desired agglomerate (See page 18, lines 19-22).

When the first tensile strength St is less than 20 MPa, if a film or sheet is produced from a resin mixed with the agglomerate, the agglomerate is broken up by kneading and drawing steps in the production process and not only fails to form effective projections in the film surface but also deteriorates the transparency of the film or sheet in the case where the breaking occurs to a far extent.

When the first tensile strength St exceeds 150 MPa, since the following of a resin at the time of drawing of a film becomes poor, it results in adverse effects to the prevention of void formation, and accordingly, that is not preferable (see page 19, line 18, to page 20, line 3).

When the second tensile strength Sta is less than 200 MPa, the agglomerate breaking by the kneading and drawing steps in the production process takes plate to so far extent in the case of producing a film or sheet from a resin containing the agglomerate and the agglomerate cannot form effective projections in the film surface and may possibly deteriorate the transparency of the film or sheet. When the second tensile strength Sta exceeds 600 MPa, the agglomerate behaves as a single particle and when a film or sheet containing the agglomerate is drawn, void formation, particle dissociation, and scratches attributed to the agglomerate added occur, and therefore, that is not preferable (see page 20, lines 8-19).

Table 1 of the specification (page 59) shows Examples 1 to 13, the agglomerates of which naturally satisfy all of the above requirements (a) to (e), while Table 2 shows Comparative Examples 1 to 7, the agglomerates of which do not satisfy one or more of the above requirements (a) to (e).

Table 3 of the specification (page 61) shows Examples 14 to 20, the agglomerates of which naturally satisfy all of the above requirements (a) to (e), while Table 4 shows Comparative Examples 8 to 14, the agglomerates of which do not satisfy one or more of the above requirements (a) to (e).

Table 5 (page 66 of the specification) shows Examples 21 to 33 in which the agglomerates of Examples 1 to 13 were contained in polypropylene homopolymer to obtain biaxially drawn polypropylene films, while Table 6 shows Comparative Examples 15 to 21 in which the agglomerates of Comparative Examples 1 to 7 were contained in polypropylene homopolymer to obtain biaxially drawn polypropylene films.

For ease of comparison, properties of Examples 21 to 33 in Table 5 and those of Comparative Examples 15 to 21 in Table 6 are summarized in the following Table A:

Table A

	Table 5	Table 6
	Examples 21-33 (Agglomerates of Example 1-13)	Comp. Ex. 15-21 (Agglomerates of Comp. Ex. 1-7)
Anti-blocking [g/10cm^2]	170 - 320	330 - 780
Haze [%]	0.9 - 1.6	1.4 - 1.9
Glos [%]	128 - 136	137 - 148
Scratch resistance [%]	0.2 - 0.6	0.7 - 1.1
Comprehensive evaluation	Δ - ◎	×

It is apparent from the above comparison that the polypropylene films containing the agglomerates of the present invention are superior to those containing the agglomerates not satisfying one or more requirements of (a) to (e).

Further, Table 7 (page 74 of the specification) shows Examples 34 to 40 in which the aaggloperates of Examples 14 to 15 were contained in polyethylene terephthalate (PET) to obtain biaxially drawn PET films, while Table 8 (page 75) shows Comparative Examples 22 to 28 in which the agglomerates of Comparative Examples 8 to 14 were contained in polyethylene terephthalate (PET) to obtain biaxially drawn PET films.

For ease of comparison, properties of Examples 34 to 40 in Table 7 and those of Comparative Examples 22 to 28 in Table 8 are summarized in the following Table B:

Table B

	Table 7	Table 8
	Examples 34-40 (Agglomerates of Example 14-20)	Comp. Ex. 22-28 (Agglomerates of Comp. Ex. 8-14)
Specific resistance (ρ [$\Omega \cdot cm^2$])	1.2×10^8 - 4×10^8	1×10^5 - 2.3×10^8
Wear resistance I	○ - ◎	× - ○
Wear resistance II	○ - ◎	× - ○
Number of coarse projections	5-3 Class	3-1 Class
Dielectric breakdown voltage [$v \cdot \mu m$]	670 - 830	250 - 450
Insulation resistance [$c \times R$ [$\Omega \cdot F$]]	1.2×10^4 - 4×10^4	7.8×10 - 8.8×10^3
Comprehensive evaluation	Δ - ◎	×

It is apparent from the above comparison that the PET films containing the agglomerates of the present invention are superior, especially in anti-blocking property and stretching resistance property, to those containing the agglomerates not satisfying one or more requirements of (a) to (e).

Skelhorn

Skelhorn discloses a thermoplastic granule containing a high proportion of a particulate carbonate filler, comprising at least 85% by weight of a particular carbonate which is coated with a fatty acid or blend of fatty acids having a carbon chain length of from 12 to 20 carbon atoms, said particulate carbonate having a particle size distribution in accordance with the specified equation. The balance of the granule is a thermoplastic polymeric binder.

Skelhorn further discloses:

> The blend produced will result in a homogeneous, inorganic material filled composite after being processed using conventional methods such as injection molding and extrusion. The invention allows inorganic material filling of thermoplastics to be achieved without the need for a separate mixing process. The invention provides a means of achieving higher concentrations of inorganic material than has been achievable by prior art without the use of an agent or additive (sometimes referred to in prior art patents as "fluidifacients") designed to facilitate ease of redispersion. (Column 1, lines 22-31).

Comparison of the present invention with Skelhorn

The present invention and Skelhorn differ from each other in the following points:

(a) The present invention provides the agglomerate of a synthesized calcium carbonate, which imparts anti-blocking property and scratching resistance property, in particular, while Skelhorn provides granular calcium carbonate, which achieves higher concentrations in thermoplastic polymers without the need for a separate mixing process and without the used of an agent or additive.

(b) To attain the above objects, the present invention requires the agglomerate to satisfy the above-mentioned requirements (a) to (e), i.e., the average particle diameter dp_{50} , the sharpness a, the BET specific surface area Sw, the first and second tensile strength St and Sta, while Skelhorn requires the particulate carbon filler to satisfy the particle size distribution defined by the specified equation.

Applicant notes that the present invention requires the agglomerate to be broken readily as recited in the St and Sta parameters, which are neither required nor disclosed by Skelhorn.

(c) The agglomerate of the present invention comprises fine primary particles (preferably 0.005 to 0.10 μm; see specification, page 22, lines 18-20) of a synthesized calcium carbonate which can be industrially stably supplied and produced at a low production cost, and which has options for physical properties and good safety properties (see page 34, lines 9-13), while the particulate carbon filler of Skelhorn preferably comprises a ground or chemically precipitated calcium carbonate or a mixture of ground and precipitated calcium carbonate. Skelhorn, in fact, states: "In many applications, a ground marble is found to be particularly advantageous" (column 3, lines 64-67). In Skelhorn's EXAMPLES 1 to 7, ground calcium carbonate or ground marble is used, which are inconsistent with the requirement of claim 1 of synthesized calcium carbonate.

From the foregoing fact, it can be safely said that Skelhorn's invention is substantially an invention directed to use of ground calcium carbonate, not to chemically synthesized calcium carbonate.

Applicant further notes that it is actually impossible or very difficult to produce ground calcium carbonate with a BET specific surface area of not less than 30 m^2/g as recited in clause (c) of claim 1, with existing technology. Applicant therefore submits that this limitation of claim 1 would not be inherent in Skelhorn's Examples.

Applicant supports this technical reasoning with the attached citation of information by RIHOKU FUNKA KOGYO CO., LTD (obtained from their Internet page at http://www.bihokufunka.co.jp/html/hinsitu.htm), and its partial English translation . According to this document, even when natural calcium carbonate was finely powdered by the up-to-date wet process super finely powdering system, the BET specific surface area would be a level of approximately 11 m^2/g, much smaller in surface area (i.e., much larger in particle size) than the value of not less than 30 m^2/g required by claim 1.

On the other hand, in the case of the synthesized (precipitated) calcium carbonate, particles meeting the BET specific surface area of claim 1 can be obtained, but the particles obtained by a usual synthetic method do not meet the other limitations of claim 1. For example, as shown in Table 2 of the specification, the particles of Comparative Example 1 have a BET specific surface area of 98 m^7/g but the average particle diameter dp_{50} is 0.48 μm, outside the present invention; particles of Comparative Example 2 have a BET specific surface area of 64 m^2/g, but the sharpness α is 4.52 outside the present invention; particles of Comparative Example 4 have a BET specific surface area of 64 m^2/g, but the sharpness is 3.25 and the second tensile strength Sta is 180 MPa, both being outside the present invention; particles of Comparative Example 6 have a BET specific surface area

of 170 m^2/g but the sharpness is 4.29, the first and second tensile strengths are 16 MPa and 190 MPa, those being outside the present invention; and particles of Comparative Example 7 have a BET specific surface area of 435 m^2/g, but the sharpness α is 3.87, outside the present invention.

In this way, the agglomerate satisfying the requirements (a) to (e) cannot be obtained with ease by a conventional synthetic method, but can be obtained by the preferable synthetic method (see page 34, line 15, to page 42, line 3).

Although Skelhorn discloses a chemically precipitated carbonate or a mixture of ground and precipitated calcium carbonate (column 3, line 64), the reference gives no disclosure on how to produce or how to mix it, and the limitations recited in claim 1 cannot be considered to be inherent in this material.

The pending claims, therefore, are not anticipated by Skelhorn.

In view of the aforementioned amendments and accompanying remarks, the claims, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, the Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS,
HANSON & BROOKS, LLP

Daniel A. Geselowitz, Ph.D.
Agent for Applicants
Reg. No. 42,573

DAG/bh
Atty. Docket No. **050226**
Suite 1000
1725 K Street, N.W.
Washington, D.C. 20006
(202) 659-2930

23850
PATENT TRADEMARK OFFICE

Attachment: Document "Bihoku" from Bihoku Funka Kogyo Co., Ltd., downloaded from http://www.bihokufunka.co.jp/html/hinsitu.htm on August 28, 2006, plus partial English translation, 5 pages total

Q:\FLOATERS\BRENDA\05 Cases\050226 Amendment in re OA of 6-6-06

Reference information

BIHOKU
BIHOKU FUNKA KOGYO CO.,LTD.

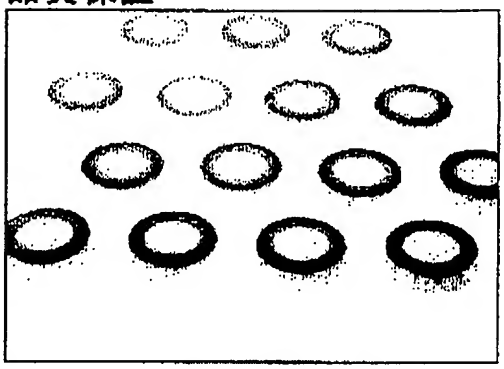
WELCOME TO OUR COMPANY THANK YOU FOR YOUR ACCESS

English

- SMOOTH
- STRONG
- HEALTHY
- SAFE
- 品質保証
- 流通システム

・事業内容

品質保証



■2002年6月　ISO9001認証取得
■2004年7月　ISO14001認証取得

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最新の湿式超微粉砕システムによりBET比表面積11㎡／g前後まで微粒子化した天然炭酸カルシウムμ－POWDOER3Nは微細でシャープな粒子にコントロールされています。また、これをベースに独自の表面処理技術で脂肪酸処理した新しいタイプの重炭酸カルシウムμ-POWDOER3Sはコロイド性炭酸カルシウムに勝る機能を発揮します。

■日本薬局方沈降炭酸カルシウム　■食品添加物炭酸カルシウム　詳細データ

2003年6月　食品添加物GMP登録
2005年　医薬品製造業(更新)

特別に純度の高い鉱山から採掘し、さらに厳選した鉱石を高度な粉砕技術によって精製微粉砕した炭酸カルシウム

で、オンリーワンの評価を受けています。純度98．5%以上、白色度96%以上の高品位で無味・無臭・無害。医薬品は制酸剤の原薬として、食品添加物としてはカルシウム補強に使用されています。さらにハイテク分野からも大きな期待を寄せられています。

標準品質物理試験

本製品は超微粒子製品です。一般製品の管理に使用されている空気透過式比表面積測定法では、誤差が大きくなるため、BET比表面積測定法を採用し、粒度管理を行っています。

試験項目	製品名	μ-POWDER 3N	μ-POWDER 3S	測定方法
比表面積	㎡/g	11.0	8.5	BET1点法
白色度	%	96	96	分光色彩・白度計
吸油量	ml/100g	41	20	JIS K 5101法に準じ、DOPを使用
45μmふるい残分	%	0.00	0.00	JIS標準ふるいを使用
pH	-	10.0	9.8	JIS K 5101常温法
水分	%	0.5	0.3	JIS K 0068
表面処理	-	無	有	

閉じる

Reference information

Internet information by BIHOKU

FUNKA KOGYO CO., LTD.

Page 1

Wet-process dried product

Natural calcium carbonate μ-POWDER 3N that was finely powdered to the BET specific surface area of approximately 11 m^2/g by the up-to-date wet process super finely powdering system is controlled to fine and sharp particles. And μ-POWDER 3S, the new type heavy calcium carbonate obtained by coating it with fatty acid by the original surface-treatment technology provides more excellent functions than colloidal calcium carbonate.

Page 3

Standard quality and physical test

These products are super finely powdered products. The particle size management is carried out by the employment of the BET specific surface area measurement method, since by the transmission type specific surface area measurement method that is employed for the management of the general purpose products, an error of measurement increases.

Product name		μ-POWDER	μ-POWDER 3S	Measument method
Test items				
Specif surface area	m^2/g	11.0	8.5	BET single-point method
Whiteness	%	96	96	Spectral color whitenessmeter
Oil absorption	ml/100g	41	20	According to JIS K5101, DOP used
45μm sieve residue	%	0.00	0.00	JIS standard sieve used
PH	—	10.0	9.8	JIS K5101 ordinary temperature method
Moisture	%	0.5	0.3	JIS K 0068
Surface-treatment	—	Not performed	Performed	